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Stephan Lewandowsky, John Cook, Klaus Oberauer and Michael Hubble-Marriott

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Stephan Lewandowsky

University of Western Australia

John Cook

University of Western Australia and University of Queensland

Klaus Oberauer

University of Zurich and University of Western Australia

Michael Marriott-Hubble

Climate Realities Research, Melbourne

Stephan Lewandowsky

School of Psychology

University of Western Australia

Crawley, W.A. 6009

stephan.lewandowsky@uwa.edu.au

Abstract

Conspiracist ideation has been repeatedly implicated in the rejection of scientific propositions, although empirical evidence to date has been sparse. A recent study involving visitors to climate blogs found that conspiracist ideation was associated with the rejection of climate science and the rejection of other scientific propositions such as the link between lung cancer and smoking, and between HIV and AIDS (Lewandowsky, Oberauer, & Gignac, in press; LOG12 from here on). This article analyzes the response of the climate blogosphere to the publication of LOG12. We identify and trace the hypotheses that emerged in response to LOG12 and that questioned the validity of the paper's conclusions. Using established criteria to identify conspiracist ideation, we show that many of the hypotheses exhibited conspiratorial content and counterfactual thinking. For example, whereas hypotheses were initially narrowly focused on LOG12, some ultimately grew in scope to include actors beyond the authors of LOG12, such as university executives, a media organization, and the Australian government. The overall pattern of the blogosphere's response to LOG12 illustrates the possible role of conspiracist ideation in the rejection of science, although alternative scholarly interpretations may be advanced in the future.

Recursive fury: Conspiracist ideation in the blogosphere in response to research on conspiracist ideation

Conspiratorial thinking, also known as conspiracist ideation, has been repeatedly implicated in the rejection of scientific propositions (Diethelm & McKee, 2009; Goertzel, 2010; Kalichman, 2009; McKee & Diethelm, 2010). Conspiracist ideation generally refers to the propensity to explain a significant political or social event as a secret plot by powerful individuals or organizations (Sunstein & Vermeule, 2009). When conspiracist ideation is involved in the rejection of science, ideations tend to invoke alternative explanations for the nature or source of the scientific evidence. For example, among people who reject the link between HIV and AIDS, common ideations involve the beliefs that AIDS was created by the U.S. Government to control the African American population or that people who take medicines for HIV are guinea pigs for the government (Bogart & Thorburn, 2005; Kalichman, 2009). Among African Americans, 16% and 44% of respondents, respectively, have been found to endorse those two beliefs (Bogart & Thorburn, 2005). Given that such conspiracist ideation has been associated with sexual risk-taking behaviors (Bogart, Galvan, Wagner, & Klein, 2011), the prominence of conspiracist ideation among people living with HIV should give rise to concern. AIDS denial also invokes ideations of censorship to explain why dissenting scientists who question the link between HIV and AIDS fail to insert their ideas into the peer-reviewed literature (Kalichman, 2009).[1]

The belief that censorship, rather than evidence-based peer-review, underlies a consensus in the scientific literature also suffuses other arenas of science denial, such as in climate science (e.g., McKewon, 2012a; Solomon, 2008) and medical research other than HIV/AIDS. For example, the tobacco industry referred to research on the health effects of smoking in internal documents as “a vertically integrated, highly concentrated,

oligopolistic cartel" (Abt, 1983, p. 127), which in combination with "public monopolies" ... "manufactures alleged evidence, suggestive inferences linking smoking to various diseases, and publicity and dissemination and advertising of these so-called findings" (Abt, 1983, p. 126).

Because peer review tends to eliminate ideas that are not supported by evidence (e.g., questioning the link between HIV and AIDS lost intellectual respectability decades ago; Nattrass, 2010, 2011), much of science denial involves the internet. The internet provides a platform for individuals who reject a scientific consensus to affirm "each other's feelings of persecution by a corrupt elite" (McKee & Diethelm, 2010, pp. 1310–1311). Internet sites such as blogs dedicated to a specific issue have therefore become hubs for science denial and they arguably play a major role in the creation and dissemination of conspiracist ideation.

The role of conspiracist ideation, and its communication through the blogosphere are also prominent in the denial of the benefits of vaccinations. Content analyses have shown that YouTube videos critical of HPV vaccinations (Briones, Nan, Madden, & Waks, 2012) and anti-vaccination blogs (Zimmerman et al., 2005) are suffused with conspiratorial content. Common conspiracist themes include alleged government cover-ups of vaccine information or suggestions that a vaccine solely exists to maximize the profit of pharmaceutical companies (Briones et al., 2012; Kata, 2010). The anti-vaccine movement has had demonstrably serious adverse public-health impacts (Poland & Jacobson, 2012). For example, nations that discontinued or reduced use of the pertussis (whooping cough) vaccine under public pressure now experience an incidence of the often fatal disease that is 10 to 100 times greater than countries that have continued vaccinations (Gangarosa et al., 1998). Lewandowsky, Ecker, Seifert, Schwarz, and Cook (2012) provide a review of the societal and cognitive processes that underlie the spread of misinformation provided by groups such as the anti-vaccination movement.

The rejection of climate science has been particularly infused with notions of a conspiracy among scientists. Accusations of conspiracies within the Intergovernmental Panel on Climate Change (IPCC) were aired in the opinion pages of the *Wall Street Journal* (*WSJ*) as early as 1996 (Lahsen, 1999; Oreskes & Conway, 2010), in a piece that alleged a "... disturbing corruption of the peer-review process." The charges focused on Chapter 8, a key component of the 1995 IPCC report that was concerned with the attribution of global warming to human activities. The *WSJ* piece was authored by an individual who had no part in the IPCC process, and subsequent scholarly work traced the origin of the charge of conspiracy and corruption to a document produced by the Global Climate Coalition, a lobby group representing 60 companies and trade associations, primarily from the energy sector (Lahsen, 1999). In her analysis of this controversy, Lahsen identified clear conspiracist themes and concluded that conspiracy theories are "... rhetorical means by which to cast suspicion on scientific and political opponents" (p. 133).

Accordingly, the titles of recent popular books critical of mainstream climate science are replete with hints of a conspiracy, with terms such as "hoax" (Bell, 2011; Inhofe, 2012), "corruption" (Montford, 2010), "scam" (Sussman, 2010), "fraud" (Solomon, 2008), or "junk science" (Isaac, 2012) being quite common. Some books have appealed directly to an alleged "conspiracy" (Inhofe, 2012), whereas others invoked a conspiracy obliquely by referring to global warming as an "assertion" by the United Nations (Alexander, 2009). Similarly, McKewon (2012a) identified broad conspiracist themes in a narrative analysis of press coverage in response to one particular climate-"skeptic" book in Australia.

Conspiracist ideation is arguably particularly prominent on climate blogs, such as when expressing the belief that temperature records show warming only because of systematic adjustments (e.g., Condon, 2009), or because "... the alarmists who oversee the collection and reporting of the data simply erase the actual readings and substitute their

own desired readings in their place" (Taylor, 2012). The role of the blogosphere in climate denial cannot be ignored: One blogger triggered several Congressional investigations into a *Nature* paper on paleoclimatology in the early 2000's, and the blogosphere continues to reverberate with alleged scandals involving climate scientists. Analyses of the blogosphere, and how it contributes to conspiracist ideation and science denial are therefore of considerable importance.

We are aware of only two reports that have quantitatively linked conspiracist ideation to the rejection of other scientific propositions: Smith and Leiserowitz (2012) found that among people who reject the findings from climate science, up to 40% of affective imagery invoked conspiracy theories. That is, when asked to provide the first word, thought, or image that came to mind in the climate context, statements such as "the biggest scam in the world to date" would be classified as conspiracist. Similarly, a recent survey of visitors to climate blogs found general conspiracist ideation to be linked to the rejection not only of climate science but also of the link between HIV and AIDS and between lung cancer and smoking (Lewandowsky et al., in press). The present article examines the denialist blogosphere's response to the study of Lewandowsky et al. (hereafter; LOG12), which we therefore present in some detail.

Conspiracist ideation and rejection of science among climate blog visitors

Lewandowsky et al. placed links to their study on a number of climate blogs with a pro-science orientation but a diverse audience of readers, including a notable proportion of climate "skeptics." The survey queried people's belief in the free market (which previous research had identified as an important predictor of the rejection of climate science; Heath & Gifford, 2006), their acceptance of climate science, their acceptance of other scientific propositions such as the link between HIV and AIDS, and most important in the present context, conspiracist ideation. The main results of Lewandowsky et al. are shown in

Figure 1.

The figure shows the structural-equation model that captured the relationship between latent variables (the large circles in the figure). Each latent variable was measured by several items (manifest variables; not shown). For example, people's endorsement of the free market was measured by items such as "An economic system based on free markets unrestrained by government interference automatically works best to meet human needs" and (reverse-coded) "Free and unregulated markets pose important threats to sustainable development" (Heath & Gifford, 2006). In replication of much previous research (e.g., Heath & Gifford, 2006; Kahan et al., 2012), endorsement of free-market ideology emerged as a strong predictor of the rejection of climate science. Free-market ideology was also found to predict the rejection of other scientific propositions.

Of greater interest in the present context is the association between conspiracist ideation and the rejection of climate science and other scientific propositions, although the strength of this association was considerably less than that of free-market ideology. The conspiracy test items were adapted from previous research (e.g., Swami, Chamorro-Premuzic, & Furnham, 2009) and consisted of various conspiracies that respondents could endorse or reject, such as "A powerful and secretive group known as the New World Order are planning to eventually rule the world through an autonomous world government which would replace sovereign governments" and "The Apollo moon landings never happened and were staged in a Hollywood film studio," and so on.[2]

When the article by Lewandowsky et al. became available for download in July-August 2012, the climate denialist blogosphere responded with considerable intensity along several prongs: Complaints were made to the first author's university alleging academic misconduct; several freedom-of-information requests were submitted to the first author's university for emails and documents relating to LOG12; multiple re-analyses of the LOG12 data were posted on blogs which purported to show that the effects reported

by LOG12 did not exist; and a number of hypotheses were disseminated on the internet with arguably conspiracist content. This response is not altogether surprising in light of research which has shown that threats—in particular to people's sense of control—can trigger targeted small-scale conspiracy theories (Whitson & Galinsky, 2008), especially those involving a specific opponent (Sullivan, Landau, & Rothschild, 2010).

The remainder of this article reports a content analysis of the hypotheses generated by the blogosphere to counter LOG12. The extent and vehemence of contrarian activity provided a particularly informative testbed for an analysis of how conspiracist ideation contributes to the rejection of science among web denizens. Unlike previous analyses of web content, the present project was conducted in "real time" as the response to LOG12 unfolded, thus permitting a fine-grained temporal analysis of the emerging global conversation. Moreover, the tight focus of the response on a single paper permitted the content analysis to be quite encompassing while still remaining manageable in size.

Method

Sampling of content

Internet activity related to LOG12 was sampled using Google search and PsychInfo. Results were limited to English-speaking sites and text.

The first phase of the search placed LOG12 into a schorlarly and public context. All peer-reviewed publications on conspiracist ideation published in 2012 were obtained from PsychInfo on 18 October 2012. Papers were located using the search terms "conspiracy" or derivatives (e.g., "conspiracist" or "conspiratorial"). For each paper obtained in this search ($N = 21$), we recorded the total number of Google hits, limited to the first 10 months of 2012, using the author's last name and the article's title (or first phrase of title for titles exceeding a single phrase) as search string. Each of those hits was then examined to establish whether it contained any recursive hypotheses, defined as any potentially

conspiracist ideation that pertained to the article itself or its author, such as "Dr Smith is a government agent," or unsubstantiated and potentially conspiracist allegations pertaining to the article's methodology, intended purpose, or analysis (e.g., "there were no human subjects").

The second phase of the search traced the response to LOG12 in the blogosphere. An on-going web search in real time was conducted by two of the authors (J.C. and M.H.M.) during the period August-October 2012. This daily search used Google Alerts to detect newly published material matching the search term "Stephan Lewandowsky." If new blog posts were discovered that featured links to other relevant blog posts not yet recorded, these were also included in the analysis. To ensure that the collection of hypotheses pertaining to LOG12 was exhaustive, Google was searched for links to the originating blog posts (i.e., first instances of a recursive theory), thereby detecting any further references to the original hypothesis or deviations from it.

Although the second phase of the search encompassed the entire (English-speaking) web, it became apparent early on that the response of the blogosphere was focused around a number of principal sites. To formally identify those sites, we began by analyzing the 30 most-frequently read "skeptic" websites, as identified by Alexa rankings. Alexa is a private company, owend by *Amazon*, that collects data on web browsing behavior and publishes web traffic reports for the higher trafficked sites. This enables comparison of the relative traffic of websites covering similar topics.

Each of those 30 sites was then searched by Google for instances of the name of the first author of LOG12 that fell within the period 28 August-18 October 2012. Sites that returned more than 10 hits were considered a principal site, and they are shown in Table 1.

Blog posts that published recursive theories were excerpted (see Online Supplementary Material for all recorded instances) with each excerpt representing a mention of the recursive theory (see Table 3 and Figure 2). Unless prevented by the

website, all Google hits from the second phase were archived using `www.webcitation.org`.

Conspiracist classification criteria

We derived six criteria from the existing literature to permit classification of hypotheses pertaining to LOG12 as potentially conspiracist (see Table 3). Our criteria were exclusively psychological and hence did not hinge on the validity of the various hypotheses. This approach follows philosophical precedents that have examined the epistemology of conspiratorial theorizing irrespective of its truth value (e.g., Keeley, 1999; Sunstein & Vermeule, 2009). The approach also avoids the need to discuss or rebut the substance of any of the hypotheses.

First, the presumed intentions behind any conspiracy are invariably nefarious (Keeley, 1999): Conspiracist ideation never involves groups of people whose intent is to do *good*, as for example when planning a surprise birthday party. Instead, conspiracist ideation relies on the presumed deceptive intentions of the people or institutions responsible for the 'official' account that is being questioned (Wood, Douglas, & Sutton, 2012). There is evidence that climate denial is infused with this assumption of nefarious intent, for example when climate science and research on the harmful effects of DDT are interpreted as a globalist and environmentalist agenda designed to impoverish the West and push civilisation back into the stone age (Delingpole, 2011). When presenting the results, we refer to this criterion by the acronym *NI*, for nefarious intention (see Table 3).

A corollary of the first criterion is the pervasive self-perception and self-presentation among conspiracy theorists as the victims of organized persecution. The theorist typically considers herself, at least tacitly, to be the brave antagonist of the nefarious intentions of the conspiracy; that is, the victim is also a potential hero. The theme of the victimization of conspiracy theorists or their allies features prominently in science denial, for example when isolated scientists who oppose the scientific consensus that HIV causes AIDS are

presented as persecuted heros and are likened to Galileo (Kalichman, 2009; Wagner-Egger et al., 2011). We refer to this persecution-victimization criterion as PV for short.

Third, during its questioning of an official account, conspiracist ideation is characterized by "...an almost nihilistic degree of skepticism" (Keeley, 1999, p. 125); and the conspiracy theorist refuses to believe anything that does not fit into the conspiracy theory. Thus, nothing is at it seems, and all evidence points to hidden agendas or some other meaning that only the conspiracy theorist is aware of. Accordingly, low trust (Goertzel, 1994) and paranoid ideation (Darwin, Neave, & Holmes, 2011) feature prominently among personality and attitudinal variables known to be associated with conspiracist ideation. The short label for this criterion is *NS* (for nihilistic skepticism).

Fourth, to the conspiracy theorist, nothing happens by accident (e.g., Barkun, 2003). Thus, small random events are woven into a conspiracy narrative and reinterpreted as indisputable evidence for the theory. For example, the conspiracy theory that blames the events of 9/11 on the Bush administration relies on "evidence" (e.g., intact windows at the Pentagon; Swami et al., 2009) that are at least equally consistent with randomness. We refer to this criterion, that nothing is an accident as *NoA* for short.

Fifth, the underlying lack of trust and exaggerated suspicion contribute to a cognitive pattern whereby specific hypotheses may be abandoned when they become unsustainable, but those corrections do not impinge on the overall abstraction that 'something must be wrong' and the 'official' account must be based on deception (Wood et al., 2012). In the case of LOG12, the 'official' account is the paper's conclusions that conspiracist ideation contributes to science denial; and it is this conclusion that *must* be wrong. At that higher level of abstraction, it does not matter if any particular hypothesis is right or wrong or incoherent with earlier ones because "...the specifics of a conspiracy theory do not matter as much as the fact that it is a conspiracy theory at all" (Wood et al., 2012, p. 5). Thus, the specific claims and assumptions being invoked by conspiracist

ideation may well be fluctuating, but they are all revolving around the fixed belief that the official version is wrong. In consequence, it may not even matter if hypotheses are mutually contradictory, and the simultaneous belief in mutually exclusive theories—e.g., that Princess Diana was murdered but also faked her own death—has been identified as an aspect of conspiracist ideation (Wood et al., 2012). We label this criterion *MbW*, for "must be wrong."

Finally, contrary evidence is often interpreted as evidence *for* a conspiracy. This ideation relies on the notion that, the stronger the evidence against a conspiracy, the more the conspirators must want people to believe their version of events (Bale, 2007; Keeley, 1999; Sunstein & Vermeule, 2009). This self-sealing reasoning necessarily widens the circle of presumed conspirators because the accumulation of contrary evidence merely identifies a growing number of people or institutions that are part of the conspiracy. Concerning climate denial, a case in point is the response to events surrounding the illegal hacking of personal emails by climate scientists, mainly at the University of East Anglia, in 2009. Selected content of those emails was used to support the theory that climate scientists conspired to conceal evidence against climate change or manipulated the data (see, e.g., Montford, 2010; Sussman, 2010). After the scientists in question were exonerated by 9 investigations in 2 countries, including various parliamentary and government committees in the U.S. and U. K., those exonerations were re-branded as a "whitewash" (see, e.g., U.S. Representative Rohrabacher's speech in Congress on 8 December 2011), thereby broadening the presumed involvement of people and institutions in the alleged conspiracy. We refer to this "self-sealing" criterion by the short label *SS*.

Results

Recursive hypotheses

Table 2 summarizes the impact of LOG12 as revealed by Google hits and, for comparison, the impact of the other 21 peer-reviewed papers published in 2012 on conspiracist ideation. The table shows that LOG12 represents an outlier compared to other papers on the same topic, especially when considering that LOG12 only received public attention in late August 2012. Thus, less than two months elapsed between its release and the data summarized in Table 2, which represent a snapshot during October 2012. It is particularly notable that unlike any of the other papers, LOG12 engendered at least 10 recursive hypotheses during that two-month period. This count subsumes all hypotheses advanced against LOG12, irrespective of whether they addressed presumed flaws in the methodology or accused the authors of deception, incompetence, or outright conspiracies.

The hypotheses are classified into distinct clusters in Table 3. The table also identifies the criteria, using the short labels introduced earlier, that support the classification of each hypothesis as conspiracist. We do not comment on the validity of any hypothesis other than those that can be unambiguously classified as false (namely, hypotheses 2, 6, 7, and 8).

Creation of those hypotheses was propelled mainly by the sites shown in Table 1, with a further 10 domain names making lesser contributions to the hypothesis-generation process. The ID numbers in Table 3 are cross-referenced in the section headings of our analysis below.

Survey responses "scammed" (1). Whenever people express their opinions it cannot be ruled out that they are "faking" their responses by providing answers that are intended to please (or deceive) the experimenter. This possibility may be exacerbated with internet

surveys that are completed outside a controlled laboratory environment. In a politically charged context, such as climate change, the further risk arises that groups of respondents may "scam" the survey by "faking" responses to deliver a "desired" outcome. This risk was instantly perceived by the blogosphere, and almost immediately (on 29 August 2012) the concern was expressed that: "The survey was so transparently designed to link climate skeptics with 'conspiracy nutters' it would hardly be surprising if a percentage of alarmists readers of those blogs understood what was required, and dutifully performed" (http://joannenova.com.au/2012/08/lewandowsky-shows-skeptics-are-nutters-by-asking-alarmists-to-fill-out-survey/).

The notion of "scamming" took center-stage in the blogosphere's response to LOG12, although not all comments went so far as to suggest "... there are no 'Human Subjects' " (http://www.shapingtomorrowsworld.org/ccc1.html#198). On numerous blogs, it appeared to be taken for granted that the data was "faked" or "scammed." In one blog post that repeated the words "scam" or "scammed" 21 times (the post ran to approximately 5,100 words), the author asserted that some respondents of the survey "... were almost certainly warmists caricaturing skeptics" (http://climateaudit.org/2012/09/08/lewandowsky-scam/).

The persistence of this hypothesis is illustrated in Figure 2. During exploration of this hypothesis, initial focus by the blogosphere rested on responses to the LOG12 survey items that targeted conspiracist ideation, with the assertion that the few people who endorsed all (or all but one) conspiracy theories ($N = 3$) might not represent authentic responses (http://climateaudit.org/2012/09/08/lewandowsky-scam/).

This assertion transmuted into several additional "scamming" hypotheses: On 8 September, a blogger claimed to have identified a "second strategy of fake responses" involving the participants ($N \simeq 120$) who disagreed with one of the survey items, namely that "fossil fuels increases atmospheric temperature to some measurable degree"

(http://climateaudit.org/2012/09/08/lewandowsky-scam/). In support, the blogger argued that those responses represented an extremist position belonging to so-called "skydragons." ("Skydragons" deny the thermal properties of greenhouse gases that were discovered in the mid 19th century.) Based on "nothing more than an impression" (http://climateaudit.org/2012/09/08/lewandowsky-scam/), the blogger estimated the actual proportion of skydragons as being no higher than 20% among "skeptics" in general. Because the observed proportion of "skydragons" was around 50% of the total number of "skeptics" in the LOG12 sample ($\simeq$ 120 out of $\simeq$ 250), this was taken to imply that "as much as 75% of the skydragon-style responses are fake."

On 23 September, the same blogger identified a further 48 participants who registered zealous support for free market ideology. This zealous support was taken to imply that those responses, too, represented scammed data as they "showed significantly greater incidence of super-zealous pro-free market sentiment" than an alternative survey conducted on a "skeptic" blog after the controversy over LOG12 erupted (http://wattsupwiththat.com/2012/09/08/replication-of-lewandowsky-survey/). The blogger concluded "that these super-zealots are fake responses by warmists acting out their caricature of skeptics" (http://climateaudit.org/2012/09/23/more-deception-in-the-lewandowsky-data/).

The pursuit of the scamming hypothesis without clear *a priori* statement of what response pattern would represent a "faked" response, and the continual shifting of the criteria for what constitutes "scamming", reveals either an inconsistent and purely ad hoc approach to data analysis or hints at an agenda-driven effort to invalidate the LOG12 data.[3] Several of our earlier criteria for conspiracist ideation point towards the latter possibility. For example, the blogosphere's response appeared driven by the need to resist the "official" explanation of an event (i.e., the LOG12 results in this instance; criterion *MbW*) and propose a sinister hidden alternative (i.e., "scamming" in this instance; *NI*).

The scamming theory was also explicitly motivated by the presumption that the LOG12 survey was intentionally designed to make "skeptics" look like "nutters"; this meshes with criteria *NI* and *PV*. Finally, without a priori specification of what constitutes faked responses, the scamming hypothesis is in principle unfalsifiable: there exists no response pattern that could not be considered "fake" by an innovative theorist. This self-sealing attribute of the hypothesis (criterion *SS*) may explain its longevity (Figure 2).

"Skeptic" blogs not contacted (2). Initial attention of the blogosphere also focused on the method reported by LOG12, which stated: "Links were posted on 8 blogs (with a pro-science science stance but with a diverse audience); a further 5 'skeptic' (or 'skeptic'-leaning) blogs were approached but none posted the link." Speculation immediately focused on the identity of the 5 "skeptic" bloggers. Within short order, 25 "skeptical" bloggers had come publicly forward (`http://www.webcitation.org/6APs1GdzO`) to state that they had not been approached by the researchers. Of those 25 public declarations, 5 were by individuals who were invited to post links to the study by LOG12 in 2010. Two of these bloggers had engaged in correspondence with the research assistant for further clarification.

This apparent failure to locate the "skeptic" bloggers led to allegations of research misconduct by LOG12 in blog posts and comments. Those suspicions were sometimes asserted with considerably confidence; "Lew made up the '5 skeptical blogs' bit. That much we know" (`http://www.bishop-hill.net/blog/2012/8/31/lewandowskys-data.html?currentPage=2#comments`). One blog comment airing the suspicion that "skeptic" bloggers had not been contacted also provided the email address to which allegations of research misconduct could be directed at the host institution of LOG12's first author. This comment was posted by an individual (SMcI; see Table 3) who had been contacted twice by the researchers' assistant.

The names of the "skeptic" bloggers became publicly available on 10 September

2012, on a blog post by the first author of LOG12; http://www.shapingtomorrowsworld.org/lewandowskyGof4.html. Although this information invalidated the hypothesis, the blogosphere's suspicion about LOG12 seemed undiminished (cf. criteria *MbW*, *NS*) and attention shifted to various other hypotheses. Two aspects of the process underlying this hypothesis shift are noteworthy.

First, the hypothesis that bloggers were not contacted was abandoned gradually. For example, one blogger opined that "...even if he [first author of LOG12] offered skeptical blogs to participate in his survey, it's pretty obvious and he must have known that most of them and probably all of them would refuse to give room to a survey organized by an alarmist whose results were likely to be distorted in a way to try to harm skeptics" (http://motls.blogspot.com.au/2012/09/stephan-lewandowskys-incredible-blog.html).[4] This hypothesis imputes a pervasive stance of suspicion among "skeptic" bloggers (criterion *NS*) because they are presumed to assume that any survey would be intended to "harm skeptics." This statement also illustrates the self-perception as a victim of persecution (PV).

Similarly, it was pointed out that "He [first author of LOG12] himself emailed or was named in emails to alarmist anti-skeptic bloggers, while he used an unknown assistant to email skeptical blogs" (http://joannenova.com.au/2012/09/lewandowsky-science-by-taunts-and-smears/). This "inconsistent delivery" sub-hypothesis lasted for 48 hours (11–13 September) and meshes well with criteria *MbW*, *NoA*, and *NI*.

Notwithstanding the abandoning of the initial "no-contact" hypothesis, the allegation that the survey was *designed* to be biased by excluding "skeptics" remained in the public domain. That is, the hypothesis that LOG12 sought to exclude "skeptics" from their survey persisted in people's inferences, even though the original basis for that inference was no longer maintained. Over a week after the "skeptic" bloggers had been

revealed, one blogger argued (on 18 September): "None of the sceptic blogs approached publish it (maybe because it's so painfully obvious to them what he's attempting to achieve and don't want a bar of it)" (`http://www.australianclimatemadness.com/2012/09/lew-a-few-final-thoughts/`); criteria *PV* and *NI*.

It is notable that concerns about the representativeness of the LOG12 sample were rarely mentioned outside the context of the hypotheses just reviewed. Only two blog comments (shown in the supplementary material) noted that because "skeptic" blogs did not post links to the survey, the LOG12 sample may have been skewed towards people who endorse the science, without also accompanying that critique with a hypothesis of nefarious intentions or malfeasance on the part of LOG12.

Once hypothesis-shifting was complete, several new hypotheses emerged in short order to counter the conclusions of LOG12. Several of those new hypotheses were based on what we call unreflexive counterfactual thinking; that is, the hypothesis was built on a non-existent, counterfactual state of the world, even though knowledge about the true state of the world was demonstrably available at the time. Table 3 indicates which of the remaining hypotheses involved this reliance on counterfactuals (marked by *UCT* in the final column). We argue later that this unreflexive counterfactual thinking is indicative either of the absence of a collective memory for earlier events, or of the lack of a cognitive control mechanism that requires an hypothesis to be compatible with *all* the available evidence (which is a hallmark of scientific cognition but is known to be compromised in conspiracist ideation; Wood et al., 2012). Unreflexive counterfactual thinking may therefore represent a distinct aspect of conspiracist ideation that has received little scientific attention to date.

Presentation of intermediate data (3). The first author of LOG12 presented a talk at Monash University on 23 September 2010. The slides for that talk were posted on the

web on 27 September 2010 and contain a single brief reference (10 words; "conspiracy factor without climate item predicts rejection of climate science") to the LOG12 data, based on the responses received by that date (virtually the entire sample).

Because this date fell within 3 days of the second (unsuccessful) approach to a "skeptic" blogger to post the link to the survey (the first one had been made 2 weeks earlier, at which time other "skeptic" bloggers were also contacted), the suggestion arose that "...he [first author of LOG12] didn't send out final emails inviting his primary sources (sceptic blogs) to participate until September 20th. It almost seems as if he [first author of LOG12] had decided on the number and nature of responses before the final data could possibly have been received" (`http://www.shapingtomorrowsworld.org/ccc2.html#225`). This hypothesis implies that the data would have been different at a later point. Given that none of the "skeptic" blogs posted a link, and therefore could not have affected the result at any point in time, this hypothesis rests on a counterfactual assumption about the world.

A more extreme variant of this hypothesis proposed that "...the results of the survey were already a foregone pre-ordained result of which the survey was only to give it the appearance of legitimacy" (`http://www.bishop-hill.net/blog/2012/8/31/lewandowskys-data.html?currentPage=2#comments`). This hypothesis identifies the survey as a "cover-up" for pre-ordained results that, presumably, were fabricated by LOG12: It thus goes a step beyond the hypothesis that a subset of the responses were "scammed."

These comments arguably reveal an intense degree of suspicion (criterion *NS*), an assumption of nefarious intent by the LOG12 authors (*NI*), and the belief that something must be wrong (*MbW*).

"Skeptic" blogs contacted after delay (4). The "skeptic" blogs were contacted at least a week after the links to the study had already been posted on the 8 other blogs that

agreed to participate in the study. This delay was greeted with suspicion by the blogosphere, with one blogger arguing "Inviting Morano on September 23 when the survey had been been initiated at least as early as August suggests less than reputable behavior on the part of the lead researcher" (`http://rankexploits.com/musings/2012/the-five-blogs/`).

This hypothesis never matured to the point of clarifying how this delay could have had any bearing on the outcome of the study given that none of the "skeptic" blogs posted the link. The hypothesis therefore represents another instance of unreflexive counterfactual thinking, in addition to suspicion and the attribution of nefarious intent (*NI, NS, MbW*). We also suggest that this hypothesis meshes well with the criterion that "nothing is an accident" (*NoA*) because it imputes significance and intentionality into an event (i.e., a delayed email) that could equally have been accidental.

Different versions of the survey (5). Because question order was counterbalanced between different versions of the LOG12 survey, links to the various versions were quasi-randomly assigned to participating blogs. The existence of different versions of the survey gave rise to several hypotheses, for example that "...the most troubling new revelation appears to be that some climate skeptic blogs got different questionaires [sic] than their counterpart AGW advocate blogs. ...this negates the study on the basis of inconsistent sampling" (`http://wattsupwiththat.com/2012/09/05/stephan-lewandowskys-slow-motion-social-science-train-wreck/`).

This hypothesis rests on counterfactual thinking: Even if survey versions had differed on some variable other than question order, given that none of the "skeptic" blogs posted the link and hence did not contribute responses, any claim regarding the published data based on those differences among versions rests on a counterfactual state of the world. Arguably, this hypothesis also rests on the presumption of nefarious intent and the belief that something must be wrong (*NI, MbW*).

On 7 September, the first author of LOG12 published a blog post explaining the reason for the different versions of the survey (http://www.shapingtomorrowsworld.org/lewandowskyVersionGate.html.) Within a day, instances of this theory ceased.

Control data suppressed (6). Data collection for LOG12 also involved an attempt to recruit a "control" sample via an emailed invitation to participate in the survey among the first author's campus community. Because this invitation returned only a small number of respondents ($N < 80$), only the sample of blog denizens was reported in LOG12.[5]

When the survey invitation was discovered by a blogger, questions emerged about those data: "What was the results of UWA staff who actually took the survey. Surely this would have made an interesting comparison group with the bloggers who are the target of the Moon-landing paper. It would have been a logical comparison. Was it done and discarded? If so, why? If it wasn't, why wasn't it done?" (http://climateaudit.org/2012/09/12/lewandowskys-unreported-results/). Reflecting the pervasive belief that something must be wrong (*NI, MbW*), those questions metamorphosed into the suggestion that the data reported by LOG12 were "cherry-picked" (http://joannenova.com.au/2012/09/lewandowsky-gets-1-7m-of-taxpayer-funds-to-demonize-people-who-disagree-with-him/).

Duplicate responses from same IP number retained (7). Following standard internet research protocols (e.g., Gosling, Vazire, Srivastava, & John, 2004), LOG12 filtered the data such that whenever more than one response was submitted from the same IP address, all those responses were eliminated from consideration. This was stated in the LOG12 Method section available for download in August 2012 as "...duplicate responses from any IP number were eliminated."

Some members of the blogosphere interpreted this statement to mean that LOG12

"... accepted multiple responses from the same IP address as long as there was a slight variation in any answer" (http://climateaudit.org/2012/09/10/the-third-skeptic/#comment-350166). Although this statement was initially qualified by noting that it was "only an interpretation", this parenthesized qualifier was dropped from subsequent re-posts of the allegation by other bloggers. The re-posts thus presented the unqualified claim that multiple responses from the same IP address could be included in the LOG12 data. The spread of this hypothesis despite being based on "only an interpretation" reveals considerable suspicion (*NS*) and also arguably the belief that *something* had to be wrong (*MbW*).

This theory lasted 2 days and was mentioned on a News Limited blog in Australia, albeit without the qualifier that it rested only on an interpretation (http://blogs.news.com.au/heraldsun/andrewbolt/index.php/heraldsun/comments/lewandowsky_was_warned_his_survey_was_no_good/).

Blocking access to authors' websites (8). On 14 September, the websites of the first two present authors (S.L.: www.shapingtomorrowsworld.org; J.C.: www.skepticalscience.com) were temporarily inaccessible (for at least 9 hours) from parts of the world, most likely owing to Internet blockages between certain regions and the website server.

This gave rise to the claim by a blogger that both sites had specifically targeted his IP number to prevent access: "I tried both sites via Hide My Ass and got through. So Lewandowsky (and Cook) are definitely blocking my IP address. It seems pretty unethical for a publicly-funded university website to slag me and simultaneously block my IP address from accessing their site or responding." This claim was subsequently qualified by the same individual by removing the "unethical" charge (original version archived at http://www.webcitation.org/6AhCviEOE). This hypothesis is illustrative of the

conspiracist tendency to assign intentionality to random events: against the background of a presumed nefarious intent (NI), nothing is an accident (NoA) and the conspiracy theorist is a victim (PV).

The claim of IP blocking then escalated into a more intricate alleged plot by LOG12 to paint their critics as paranoid. One commenter warned "Watch, they may unblock you just so they can say you are paranoid, hyper-sensitive, were never really blocked" (`http://climateaudit.org/2012/09/14/the-sks-link-to-the-lewandowsky-survey/#comment-352577`). A different commenter similarly interpreted the IP blocking as a deliberate attack: "Yep, if your argument is that X is paranoid, bombard him with attacks that are deniable and leave no traces, then the moment he squeals say 'Told you so.'" (`http://climateaudit.org/2012/09/14/the-sks-link-to-the-lewandowsky-survey/#comment-352577`). Another commenter applauded the alleged cunning strategy to goad bloggers into paranoid behavior: "If it's true they are selectively blocking, I have to begrudgingly respect the skill with which they are playing this audience: there is no way for anyone to complain without matching the stereotypical conspiracist of the study!" (`http://climateaudit.org/2012/09/14/the-sks-link-to-the-lewandowsky-survey/#comment-352753`).

This reasoning is reminiscent in its complexity of other conspiracist ideation, for example surrounding the events of 9/11: "After 9/11, one complex of conspiracy theories involved American Airlines Flight 77, which hijackers crashed into the Pentagon. Even those conspiracists who were persuaded that the Flight 77 conspiracy theories were wrong folded that view into a larger conspiracy theory. The problem with the theory that no plane hit the Pentagon, they said, is that the theory was too transparently false, disproved by multiple witnesses and much physical evidence. *Thus the theory must have been a straw man initially planted by the government, in order to discredit other conspiracy theories and theorists by association*" (Sunstein & Vermeule, 2009, p. 223, emphasis added).

The blogosphere's apparent concern over being "baited" into "acting paranoid" is consonant with the excessive level of suspicion identified earlier as a criterion (*NS*) of conspiracist ideation and it reveals the pervasive self-perception of climate deniers as victims (*PV*). The hypothesis also exemplifies the conspiracist tendency to detect meaning and intentionality behind accidental events (*NoA*).

The IP blocking hypothesis persisted for a day. The originator of the claim updated his comment (without however acknowledging the removal of the "unethical" charge), stating that "...it is possible that the blocking was caused by internet blocks en route to Australia, with Hide My Ass access occurring because it used a different route. Seems not only possible, but likely" (`http://climateaudit.org/2012/09/14/the-sks-link-to-the-lewandowsky-survey/#comment-352542`).

Miscellaneous hypotheses (9). Two miscellaneous hypotheses deserve mention as they provide insight into the recursive and self-reinforcing nature of conspiracist ideation.

A regular contributor to the blog of the second author of the present paper (`www.skepticalscience.com`) posted a public critique of LOG12 (`http://www.skepticalscience.com/AGU-Fall-Meeting-sessions-social-media-misinformation-uncertainty.html#84306`). While this post was welcomed and reposted by critics of LOG12, one commenter treated it with suspicion, arguing that: "In fact it looks more that your critisism [sic] of Lewandowsky article title was a false flag operation meant to confuse/ distract scrutiny of SkS [skepticalscience.com] dubious involvement in this unreliable survey. It failed. You have not shot yourself in the foot but somewhere else, more fatal" (`http://climateaudit.org/2012/09/12/lewandowsky-study-useless-unless-authors-demonstrate-data-integrity/#comment-351497`). This reasoning is reminiscent of the "decoy theory" just described in the context of 9/11 and illustrates the self-sealing nature of conspiracist reasoning (*SS*).

A further hypothesis supposed that the real purpose of LOG12 was to provoke

conspiracist ideation from climate deniers: "Here's a conspiracy theory for you: This is the subject of the study, not the survey. The reactions of the skeptic community to a controlled publication with obvious flaws, presented as caustically as possible and with red herrings presented for them to grasp at. There's some evidence for this theory in internal mails at SkepticalScience, where John Cook can be heard talking enthusiastically about his discussions with Stephan about gaming blogs" (`http://www.shapingtomorrowsworld.org/news.php?p=2&t=118&&n=161#751`). This theory inconsistently assumes (a) that LOG12 does not contain valid results, although (b) for this theory to be true, the conclusions of LOG12 (a positive correlation between climate denial and conspiracist ideation) must be true because otherwise no such expectation about the "skeptic" response can be formulated. Notwithstanding its inconsistency, the existence of the present article is consonant with this theory.

Beyond recursion: Global activism and government censorship (10). Thus far, we considered only strictly recursive theories—that is, hypotheses that were spawned by LOG12 and pertained to the methodology and results of LOG12. We conclude with an analysis of theories that were spawned by LOG12 but expanded beyond being recursive.

The expansion commenced when one blogger suggested: "That's quite a little activist organization they have running out of the University of Western Australia. I wonder if UWA officials realize the extent that UWA has become a base for this global climate activism operation and if they condone it?" (`http://wattsupwiththat.com/2012/09/12/the-cook-lewandowsky-social-internet-link/`).

Another blogger further promoted this theory, linking to the above post and commenting "SkepticalScience [the blog of the present second author, J.C.] seems to becoming the ringleader for conspiratorial activities by the green climate bloggers" (`http://judithcurry.com/2012/09/15/bs-detectors/`). Notably, this blogger explicitly referred to *conspiratorial* activities by, presumably, the authors of LOG12 and their

associates.

A commenter sought to clarify the extent of this presumed conspiratorial activity, claiming that: "It's mostly a 3-man show: Lew [Lewandowsky], Cook and UWA maths professor Kevin Judd, who is the real strategist behind all this" (http://wattsupwiththat.com/2012/09/12/the-cook-lewandowsky-social-internet-link/#comment-1076866). Kevin Judd's apparent leadership role in this conspiracy was reinforced in a subsequent comment: "As local I can confirm that the Maths Prof Kevin Judd is the mastermind behind UWA AGW. He is apparently a brilliant mathematician, chess and go player, and computerwizz. He is a typical reclusive mad scientist. There is no doubt he is behind all UWA" (http://wattsupwiththat.com/2012/09/12/the-cook-lewandowsky-social-internet-link/#comment-1076866).

A more extended variant of this hypothesis cited the research funding for the first author of LOG12 available on his webpage: "Here Lewandowsky proudly details his $4.4 million in grants. Which includes $762,000 specifically related to Climate Research funding in the last year or two, and none of that includes the $6 million the Federal Government provided him and a few colleagues to found and run 'The Conversation' which provides a substantial forum for his 'Climate Change position'" (http://watchingthedeniers.wordpress.com/2012/09/13/watts-explains-why-lewandowsky-paper-on-conspiracy-theories-is-wrong-its-a-conspiracy-between-john-cook-and-the-prof/#comment-14459). 'The Conversation' refers to an online newspaper (http://theconversation.edu.au/who_we_are) that is primarily written by academics and is funded by a consortium of major Australian universities and other scientific organizations. This hypothesis thus widens the scope of the presumed activism by LOG12 authors to include a national online media initiative.

The expanding scope of the presumed conspiracy exhibited considerable longevity,

as evidenced by a blogpost several months later that was triggered by a radio interview with the first author of LOG12 on the Australian Broadcasting Corporation's (ABC) science show: "The government, via the Australian Research Council [ARC] is involved in suppressing dissent. ... Lewandowsky has received over $2 million worth of ARC funding to support his efforts to equate climate change scepticism with mental disorder. 'Punitive psychology' as it is called, was widely used in the Soviet Union to incarcerate dissidents in mental institutions. In modern Australia the walls of the prison are not brick or stone, but walls of censorship, confining the dissident to a limbo where no-one will report what they say for fear of being judged mentally deficient themselves. ... But the problem is obviously more widespread and involves the University of Western Australia, where Lewandowsky holds his chair, the ARC, the ABC, and possibly even the government" (`http://www.ambitgambit.com/2012/11/24/paedophilia-climate-science-and-the-abc/`).

Common to all these hypotheses is the presumption of widespread nefarious intent among the authors of LOG12 and colleagues (NI) and a potentially self-sealing propensity to broaden the scope of the presumed malfeasance (SS): Extending the presumed malfeasance to include the Australian government may amplify a self perception of being victimized (PV).

Freedom-of-information release

On 10 October 2012, the host institution of the first author of LOG12 released a tranche of emails and documents that had been requested by a "skeptic" climate blogger under Freedom-of-information (FOI) legislation. One set of emails involved all correspondence between the researchers and the blogs that were contacted to host the survey, including those that by an initial hypothesis—number 2 in Table 3—were presumed not to exist. The remaining documents and emails pertained to the institutional ethics approval for the study reported by LOG12. Because the FOI release occurred about

a month after the last hypothesis spontaneously emerged in response to LOG12, it is considered separately from the other hypotheses summarized in Table 3.

Although the released correspondence confirmed the chronology that underpinned an earlier hypothesis, relating to the dates at which "skeptic" bloggers were contacted (hypothesis 4 in Table 3), this confirmatory evidence was ignored and no further mention of this hypothesis was made. Instead, the blogosphere focused on the ethics approvals underlying the study.

The existence of ethics approval was met by a broadening of the scope of presumed malfeasance, from the authors of LOG12 to the ethics committee and its chair at the first author's institution. To illustrate, one blogger claimed that the "... approval originally obtained was for a fundamentally different project, and the nature of the amendment and its rapid approval raises a number of questions for the university ... How was it possible that the EC [ethics committee] could have reviewed such substantive changes and come to a decision within 24 hours?" (`http://www.australianclimatemadness.com/2012/10/lewandowsky-foi-substantial-last-minute-changes-to-project-waved-through-by-uwa-ethics-committee/`).

The broadening of the scope of purported malfeasance to include additional people or institutions in light of disconfirmatory evidence is a principal attribute of conspiracist ideation (Keeley, 1999). The self-sealing response to the freedom-of-information release therefore illustrates several of our classification criteria (viz., *NI, NS, MbW*, and in particular *SS*). The alternative hypothesis, namely that the existence of ethics approvals in conformance with applicable procedures might confirm that there were no ethical problems with the LOG12 study was not considered by the blogosphere.

Discussion

Potential limitations

Our analysis was concerned with the blogosphere's response to a single 4,000-word article. One might therefore question the generality of our results. In response, we note that at least one other scientific report in the climate arena engendered a sustained critique that subsequent scholarly analysis identified as conspiracist (Lahsen, 1999). Likewise, conspiratorial themes have been found to be prominent in media coverage of climate-related issues (McKewon, 2012a), and accounts by climate scientists of the strategies of climate denial are replete with accounts of conspiratorial accusations against individual papers (e.g., Mann, 2012). We therefore suggest that the present analysis illuminated not just an isolated incident but the broader propensity of climate denial to involve a measure of conspiracist ideation; a suggestion that is consonant with the slant of recent popular books espousing denial (e.g., Alexander, 2009; Bell, 2011; Inhofe, 2012; Isaac, 2012; Montford, 2010; Solomon, 2008; Sussman, 2010).

A second criticism might cite the fact that we have considered the "blogosphere" as if it were a single entity, analyzed within the context of psychological processes and constructs that typically characterize individuals rather than groups. Our response is twofold: First, at the level of purely descriptive discourse analysis, our work fits within established precedent involving the examination of communications from heterogeneous entities such as the U.S. Government (Kuypers, Young, & Launer, 1994) or the Soviet Union (Kuypers, Young, & Launer, 2001). Second, at a psychological level, numerous psychological constructs—such as cognitive dissonance, social dominance orientation, or authoritarianism—have been extended to apply not only to individuals but also to groups or societies (e.g., Moghaddam, in press). We therefore argue that our extension of individual-level work on conspiracist ideation to the level of amorphous groups fits within

precedent in two areas of scholarly enquiry.

A further criticism might hold that although we may have presented some evidence for the presence of conspiracist ideation, the evidence falls far short of "real" conspiracy theories involving events such as 9/11 or the moon landing. In response, we note that the hypotheses leveled against LOG12 do not differ qualitatively—that is, in terms of magnitude or scope—from others that have been identified as conspiracist in the context of another paper in the climate arena (Lahsen, 1999) or that have been observed in response to experimental manipulations (Whitson & Galinsky, 2008). We suggest that conspiracist ideation, like most other psychological constructs (e.g., extraversion), represents a continuum that finds expression to varying extents in theories of varying scope.

In a related vein, critics might propose an alternative explanation for the behavior of the blogosphere based on a dissonance effect. Science denial commonly involves "skeptics' " self-perception of being the only rational consumers of information in a sea of corrupt or self-serving scientists (Kalichman, 2009; Wagner-Egger et al., 2011). Given that the data of LOG12 arguably challenged that perception, the resultant dissonance—rather than some underlying general predisposition—may have triggered the observed conspiracist response. This alternative explanation meshes with previous observations that conspiracist ideation can arise in response to threats in a random sample of participants (e.g., Whitson & Galinsky, 2008); however, it meshes less well with the conspiratorial undercurrent that suffused public climate denial even before the LOG12 data became public (e.g., Alexander, 2009; Bell, 2011; Inhofe, 2012; Isaac, 2012; Montford, 2010; Solomon, 2008; Sussman, 2010). In any case, this hypothesis is not in opposition to ours: We would expect that a person's disposition to engage in conspiratorial thinking is more likely to become manifest when triggered by factors such as cognitive dissonance.

Critics might furthermore argue that our analysis of the response to LOG12 was over-extensive, and that some of the hypotheses advanced by the blogosphere in fact

constituted legitimate criticism. This criticism is rendered less potent by the fact that our analysis was conducted at a psychological level, without regard to the truth value of any of the hypotheses other than those that could be unambiguously classified as false (i.e., hypotheses 2, 6, 7, and 8 in Table 3). We remain neutral with respect to the question whether the remaining hypotheses presented valid criticisms. The issue of validity of those hypotheses—or indeed the validity of the conclusions of LOG12—is orthogonal to the psychological question at issue here, viz. whether the response to LOG12 constituted conspiracist ideation.

Our decision not to address the validity of any of the hypotheses also helps allay one important remaining issue: Two of the present authors also contributed to LOG12, and the present analysis may therefore be biased by a potential conflict of interest. This possibility cannot be ruled out, although a balanced evaluation would note that the present article arguably goes against the interests of those two authors, because it placed several criticisms of LOG12 into the peer-reviewed literature that previously had been limited to internet blogs. Given the well-known resistance of information to subsequent correction (e.g., Lewandowsky, Stritzke, Oberauer, & Morales, 2005; Lewandowsky, Ecker, et al., 2012), the present article could therefore equally be taken to run counter to the interests of the LOG12 authors. In addition, because data collection (via internet search) was conducted by two authors who were not involved in analysis or report of LOG12, the resulting "raw" data—available in the online supplementary material—cannot reflect a conflict of interest involving the LOG12 authors. Moreover, the availability of these raw data enables other scholars to bring an alternative viewpoint to bear during any reanalyses.

Theoretical and pragmatic implications

Implications for understanding conspiracist ideation. Our principal thesis is that some of the responses to LOG12 voiced in the blogosphere satisfy attributes of conspiracist ideation by the criteria defined at the outset. Two attributes deserve to be highlighted: First, most of the hypotheses can be unified under the immutable belief that "there must be something wrong" (*MbW* in Table 3) and that the authors of LOG12 engaged in intentional malfeasance (*NI, NS*). Those underlying beliefs infused conspiracist elements even into those hypotheses that would be expected to arise during routine scholarly critique. For example, the "scamming" hypothesis evolved continuously without being guided by clear a priori assumptions about what would constitute a "scammed" response profile, thereby ultimately rendering this hypothesis self-sealing and unfalsifiable (criterion *SS*). It is this psychological attribute that points towards a conspiracist component rather than conventional scholarly critique.

Second, self-sealing reasoning also became apparent in the broadening of the scope of presumed malfeasance on several occasions. When ethics approvals became public in response to an FOI request, the presumption of malfeasance was broadened from the authors of LOG12 to include university executives and the university's ethics committee. Similarly, the response of the blogosphere evolved from an initial tight focus on LOG12 into an increasingly broader scope. Ultimately, the LOG12 authors were associated with global activism, a $6 million media initiative, and government censorship of dissent, thereby arguably connecting the response to LOG12 to the grand over-arching theory that "climate change is a hoax." Notably, even that grand "hoax" theory is occasionally thought to be subordinate to an even grander theory: one of the bloggers involved in the response to LOG12 (cf. Table 1) considers climate change to be only the *second* biggest scam in history. The top-ranking scam is seen to be modern currency, dismissed as "government money" because it is not linked to the gold standard

(http://joannenova.com.au/2012/03/we-are-all-austrians-now/).

The observed broadening of scope meshes well with previous research that has identified stable personality characteristics that predict the propensity for conspiracist ideation (cf. Douglas & Sutton, 2011; Goertzel, 1994; Swami et al., 2009). It is therefore not altogether surprising that suspicions about a single scholarly paper can rapidly mature into more encompassing hypotheses. We suggest that some of the variables that predict conspiracist ideation—viz. low trust (Goertzel, 1994) and paranoid ideation (Darwin et al., 2011)—were observable in the response to LOG12. Those variables are revealed by statements such as: "Given the *lack of evidence* that he [first author of LOG12] tried to contact skeptic blogs, and his bizarre excuse for not reporting the blogs he tried to contact when describing his methodology, some people suspect he didn't try very hard to contact skeptic blogs. But that *suspicion* is not a conspiracy theory" (http://rankexploits.com/musings/2012/conspiracy-theory-get-lewindowsky-a-dictionary-stat/, emphasis added).

Whereas suspicion on its own is insufficient to identify conspiracist ideation, it arguably constitutes one of its core attributes. For example, the suspicion that LOG12 did not contact "skeptic" bloggers tacitly invokes several major presumptions, namely (a) that the authors of LOG12 were willing to engage in research misconduct; (b) that they would invent a claim about a non-event and publish it in a Method section when there was no incentive or reason to do so; and (c) that they should have somehow provided "evidence" beyond writing an accurate Method section. The ease with which those presumptions about misconduct and malfeasance were made and accepted provides a fertile environment for the subsequent unfolding of conspiracist ideation (cf. Keeley, 1999; Wood et al., 2012).

Our research also points to at least two issues that merit further investigation. The first issue arises from the well-established fact that the rejection of climate science is strongly associated with right-wing political leanings and the embrace of a

"fundamentalist" laissez-faire vision of the free market (e.g., Dunlap & McCright, 2008; Feygina, Jost, & Goldsmith, 2010; Hamilton, 2011; Heath & Gifford, 2006; Kahan, 2010; Kahan, Jenkins-Smith, & Braman, 2011; McCright & Dunlap, 2011a, 2011b). There is a parallel literature that has linked conspiracist ideation, at least in some cases, with right-wing political leanings: For example, Swami (2012) fund endorsement of an anti-Semitic conspiracy theory in Malaysia to be associated with right-wing authoritarianism. Similar associations with authoritarianism have been reported by Abalakina-Paap, Stephan, Craig, and Gregory (1999) and Swami et al. (2012) in samples of Western participants. One might therefore be tempted to consider conspiracist ideation another manifestation of the "paranoid style" in American politics—mainly focused on the political Right—that was famously highlighted by Hofstadter (1966). On this view, the involvement of conspiracist ideation in climate denial would be expected as a likely by-product of the strong ideological drivers underpinning rejection of climate science. There are several indications that acceptance of this view would be premature: LOG12 found no association between conspiracist ideation and free-market ideology in their structural-equation model (see Figure 1), and in a similar study involving a representative sample, Lewandowsky, Gignac, and Oberauer (2013) found conspiracist ideation to be *negatively* associated with free-market ideology and conservatism. (Related results were reported by Swami et al., 2009.) The relationship between conspiracist ideation and political worldviews thus remains to be pinned down.

Second, we uncovered a potentially novel aspect of conspiracist reasoning when some of the later hypotheses were found to involve a residual impact of earlier, discarded hypotheses. For example, whereas critics initially argued that the results of LOG12 were invalid because "skeptic" bloggers were not contacted (hypothesis 2 in Table 3), upon release of evidence to the contrary, the same conclusion of invalidity was reached by other means; either because of a preliminary report of the data during a colloquium (hypothesis

3); or because of the presumedly faulty timing of the correspondence (hypothesis 4); or because "skeptic" bloggers were emailed different versions of the survey (hypothesis 5). All of those hypotheses rely on counterfactual thinking because no "skeptic" blogger posted links to the survey, and therefore neither the dates of correspondence nor the version of the survey (nor any other event involving those bloggers) could have affected the data as reported in LOG12.

Although there appears to be ample evidence to classify the response to LOG12 at least in part as conspiracist, one must guard against overextending this conclusion: There are other streams of science denial that are detectable in the response to LOG12. For example, the repeated re-analysis of data, involving the elimination of "inconvenient" subsets of data points based on fairly fluid criteria, has a long-standing history in other contentious arenas. Michaels (2008) reviews the extensive history of epidemiological data that were subject to industry-sponsored re-analysis because of their regulatory implications, such as reports of the association between tobacco and lung cancer, or the link between bladder cancer and chemicals used in dye production. Re-analyses by industry bodies often fail to detect previously-published links between, say, tobacco use and cancer or heart disease (e.g., Cataldo, Bero, & Malone, 2010; Proctor, 2011). A common technique underlying those re-analyses involves the selective removal of data points based on ad hoc criteria (Michaels, 2008); this technique is also detectable in the various re-"analyses" of the LOG12 data to buttress hypothesis 1 from Table 3.

Implications for understanding science denial. The discovery by John Tyndall that CO_2 is a greenhouse gas dates back over 150 years. Recognition of the possibility that industrial CO_2 emissions may alter the planet's climate dates back more than a century, and during the last two decades the scientific evidence for the fact that humans are interfering with the climate has become overwhelming. The vast majority of domain experts agree that the climate is changing and that human CO_2 emissions are causing this

change (Anderegg, Prall, Harold, & Schneider, 2010; Doran & Zimmerman, 2009; Oreskes, 2004).

Given this broad agreement on the fundamentals of climate science, what cognitive mechanism would underlie people's dissent from the consensus? We suggest that if a person rejects an overwhelming scientific consensus, such as the one for climate science, then that person needs to deny that the consensus emerged as the result of researchers converging independently on the same evidence-based view. Rejection of the scientific consensus thus calls for an alternative explanation of the very existence of that consensus. The ideation of a secretive conspiracy among researchers can serve as such an explanation (Diethelm & McKee, 2009; McKee & Diethelm, 2010; Smith & Leiserowitz, 2012). Moreover, the ideation of a conspiracy may also serve as a "fantasy theme" that permits groups to develop and share a symbolic reality. Such fantasy themes (e.g., the denier as "Galileo" who opposes a corrupt iron-fisted establishment) operate as bonding agents that build group cohesion by creating a shared social reality. Fantasy themes are known to play a major role in climate denial (McKewon, 2012b, 2012a).

Accordingly, there is growing evidence of the involvement of conspiracist ideation in climate science denial (Lewandowsky et al., in press; McKewon, 2012a; Smith & Leiserowitz, 2012) as well as the denial of other scientific propositions (Diethelm & McKee, 2009; Goertzel, 2010; McKee & Diethelm, 2010). The prevalence of conspiracist ideation has notable implications for science communicators.

Implications for science communication. A defining attribute of conspiracist ideation is its resistance to contrary evidence (e.g., Bale, 2007; Keeley, 1999; Sunstein & Vermeule, 2009). This attribute is particularly troubling for science communicators, because providing additional scientific information may only serve to reinforce the rejection of the evidence, rather than foster its acceptance. A number of such "backfire" effects have been identified, and they are beginning to be reasonably well understood (Lewandowsky, Ecker,

et al., 2012). Although suggestions exist about how to rebut conspiracist ideations—e.g., by indirect means, such as affirmation of the competence and character of proponents of conspiracy theories, or affirmation of their other beliefs (e.g., Sunstein & Vermeule, 2009)—we argue against direct engagement for two principal reasons.

First, much of science denial takes place in an epistemically closed system that is immune to falsifying evidence and counterarguments (Boudry & Braeckman, 2012; Kalichman, 2009). We therefore consider it highly unlikely that outreach efforts to those groups could be met with success. Second, and more important, despite the amount of attention and scrutiny directed towards LOG12 over several months, the publication of recursive hypotheses was limited to posts on only 24 websites, with only 13 blogs featuring more than one post (see Table 1). This indicates that the recursive theories, while intensely promoted by certain bloggers and commenters, were largely contained to the "echo chamber" of climate denial. Although LOG12 received considerable media coverage when it first appeared, the response by the blogosphere was ignored by the mainstream media. This confinement of recursive hypotheses to a small "echo chamber" reflects the wider phenomenon of radical climate denial, whose ability to generate the appearance of a widely held opinion on the internet is disproportionate to the smaller number of people who actually hold those views (e.g., Leviston, Walker, & Morwinski, 2012). This discrepancy is greatest for the small group of people who deny that the climate is changing (around 6% of respondents; Leviston et al., 2012). Members of this small group believe that their denial is shared by roughly half the population. Thus, although an understanding of science denial is essential given the importance of climate change and the demonstrable role of the blogosphere in delaying mitigative action, it is arguably best met by underscoring the breadth of consensus among scientists (Ding, Maibach, Zhao, Roser-Renouf, & Leiserowitz, 2011; Lewandowsky, Gignac, & Vaughan, 2012) rather than by direct engagement.

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Footnotes

[1] In current scholarly usage the term "denial" is often reserved to describe an active public denial of scientific facts by various means, such as the use of rhetoric to create the appearance of debate where there is none (Diethelm & McKee, 2009; McKee & Diethelm, 2010). The term "rejection of science," by contrast, has been used in research aimed at identifying the factors that predispose people to be susceptible to organized denial (e.g., Lewandowsky et al., in press). In the present article, we frequently use the term "denial" because the object of our study is on the active and public dissemination of information.

[2] The study also queried whether several long-standing environmental issues, such as acid rain, continue to present a problem. Figure 1 shows that the perception that previous environmental problems have been solved was negatively associated with climate science but was unrelated to other sciences; this effect is of little interest in the present context.

[3] The criteria for this hypothesis may also have shifted in response to a blogpost by two of the authors of LOG12 which demonstrated the resilience of their main findings to the removal of outliers on the measure of greatest interest, the endorsement of the various conspiracy theories, on 12 September 2012 (`http://www.shapingtomorrowsworld.org/lewandowskyScammers1.html`). This analysis is reproduced in the supplementary online material for LOG12.

[4] This statement was made on the same day that the bloggers' names were released and it is impossible to ascertain whether it predated or postdated the release.

[5] The authors subsequently obtained a control sample via a professional survey firm in the U.S: This representative sample of 1,000 respondents replicated the results involving conspiracist ideation reported by LOG12 (Lewandowsky et al., 2013).

Table 1

Principal web sites involved in blogosphere's response to the publication of LOG12

Website	Google hits[a]	Blog Posts[b]
wattsupwiththat.com	747	11
joannenova.com.au	82	8
junkscience.com[d]	40	3
climateaudit.org*	36	11
bishophill.squarespace.com	33	4
australianclimatemadness.com[c]	30	7
climatedepot.com*[d]	20	17
rankexploits.com/musings	18	6
warwickhughes.com	16	0
noconsensus.wordpress.com	13	2

Note. Sites identified with an asterisk were among the 5 sites contacted by LOG12 with an invitation to participate in the study.

[a] Total number of hits on each site to the name of the first author of LOG12 that fell within the period 28 August-18 October 2012.

[b] Total number of blog posts featuring recursive theories about LOG12 posted within the period 28 August-18 October 2012.

[c] This blog is not among the top-30 "skeptic" sites but was a principal player in the response to LOG12 because its proprietor launched several freedom-of-information requests relating to LOG12.

[d] These blogs reposted content from other blogs but published no original content of their own.

Table 2

Summary of impact of peer-reviewed psychological articles on conspiracist ideation published in 2012

Citation	Google hits [1]	Recursive hypotheses
LOG12	443 (2)	10
Grebe & Nattrass (2012)	13 (9)	0
Briones et al. (2012)	11 (9)	0
Hamdy & Gomaa (2012)	12 (5)	0
Nattrass (2012)	13 (3)	0
Hoyt et al. (2012)	11 (1)	0
Vu, Tun, Sheehy, & Nel (2012)	10 (3)	0
de Zavala & Cichocka (2012)	8 (6)	0
Clark (2012)	7 (1)	0
Aupers (2012)	5 (2)	0
Baleta (2012)	6 (1)	0
Tun et al. (2012)	5 (2)	0
Moritz et al. (2012)	4 (1)	0
Swami et al. (2012)	3 (3)	0
Barbieri & Klausen (2012)	3 (2)	0
Collins & Chamberlain (2012)	3 (1)	0
Cook (2012)	3 (1)	0
Schneider-Zioga (2012)	3 (1)	0
Drinkwater, Dagnall, & Parker (2012)	2 (1)	0
Gholizadeh & Hook (2012)	2 (1)	0

[1] Total number of hits, with hits in Google Scholar in parentheses.

Liebich (2012)	2 (1)	0
Krychman (2012)	1 (1)	0

Table 3

Summary of recursive—and at least partially conspiracist—hypotheses advanced in response to LOG12 during August - October 2012

ID	Date	Originator[a]	Summary of hypothesis	Criteria[b]
1	29 Aug	JN	Survey responses "scammed" by warmists	*NI, PV, MbW, SS*
2	29 Aug	JN	"Skeptic" blogs not contacted	*NI NS PV*
3	3 Sep	ROM	Presentation of intermediate data	*NI, NS, MbW, UCT*
4	4 Sep	GC	"Skeptic" blogs contacted after delay	*NI, NS, MbW, NoA, UCT*
5	5 Sep	SMcI	Different versions of the survey	*NI, MbW, UCT*
6	6 Sep	SMcI	Control data suppressed	*NI, NoA*
7	10 Sep	SMcI	Duplicate responses from same IP number retained	*NS, MbW*
8	14 Sep	SMcI	Blocking access to authors' websites	*NI, PV, NoA*
9	Various	Various	Miscellaneous hypotheses	See text
10	12 Sep	AW	Global activism and government censorship	*NI, PV, SS*

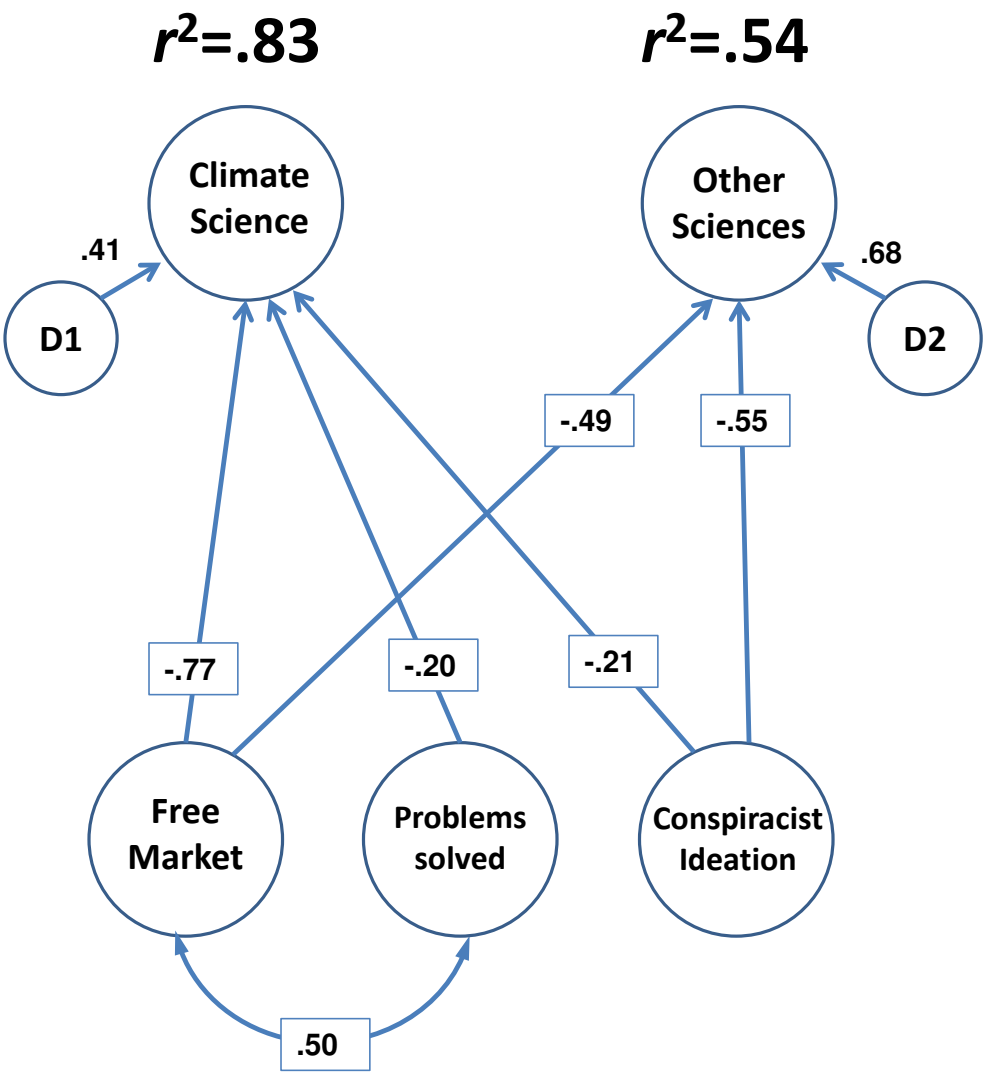
[a] Attribution is based on where and by whom a hypothesis was first proposed in public. JN=Jo "Nova" of `joannenova.com.au`; ROM=Anonymous commenter with pseudonym ROM at `www.bishop-hill.net`; GC=Geoff Chambers (commenter at `www.shapingtomorrowsworld.org`); SMcI=Steve McIntyre of `www.climateaudit.com`; AW=Anthony Watts of `wattsupwiththat.com`.

[b] NI=nefarious intent; NS=nihilistic skepticism; PV=persecuted victim; MbW=must be wrong; NoA=no accident; SS=self sealing; UCT=unreflexive counterfactual thinking.

Figure Captions

Figure 1. Latent variable model reported by Lewandowsky, Oberauer, & Gignac (in press) that predicts acceptance of climate science and acceptance of other scientific propositions on the basis of free-market ideology, the perception that earlier environmental problems have been solved, and conspiracist ideation. All regression weights and correlations are significant and standardized. Weights and correlations that are not shown were set to zero (e.g., correlation between the residuals of climate science and other sciences). Manifest variables for each latent variable are omitted for clarity. Adapted from Lewandowsky, S.; Oberauer, K. & Gignac, G. E., in press, NASA faked the moon landing—therefore (climate) science is a hoax: An anatomy of the motivated rejection of science, *Psychological Science*. Reprinted with permission.

Figure 2. Timeline of principal recursive theories developed by the blogosphere in response to LOG12. Density of shading reflects the number of mentions of each particular theory on a particular date.


r^2=.83
r^2=.54
Climate Science
Other Sciences
.41
.68
D1
D2
-.49
-.55
-.77
-.20
-.21
Free Market
Problems solved
Conspiracist Ideation
.50

Recursive fury, Figure 2